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MEASURING PROGRESS IN LEARNING LATIN

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Purpose of the Present Investigation

The chief purpose of the present investigation, which is only a preliminary study, is to measure the growth of power in three elements of Latin assumed to be fundamental—vocabulary, translation, grammar; a second purpose is to ascertain what correlations exist between these phases of growth.¹

THE TESTS

Naturally, the first problem was to develop suitable tests in the three fundamentals of language acquisition named above. Since the aim is to measure the gain in power in these fundamentals, it is obvious that the tests must satisfy two conditions, namely: (1) they must be suitable for first-year pupils; and (2) they must be applied to the same pupils at about the same time of the year in subsequent years. The tests finally adopted are given in Table I below.

It will be seen that the conditions which the tests must satisfy were met as follows:

a) No word appears in the four vocabularies of fifty words each which occurs less than one hundred times in Caesar and Cicero.² Our results seem to justify the use hereafter of only one of these vocabularies (of fifty words each) instead of all four (two hundred words). (For further suggestions on this point, see the summary in Table V, at the end of this report.)

b) The translation test contains only constructions which are found at least five hundred times in Caesar and Cicero.³

¹ Three graduate students working under my direction were assigned to this investigation: Messrs. D. H. Fletcher, A. J. Chidester, and J. F. Butterworth. By far the greater part of the work was done by Mr. Fletcher.

² See *Latin Word List*, by George H. Browne, Ginn & Co.

³ See *Syntax of High School Latin*, edited by Lee Byrne, The University of Chicago Press.

c) The grammar test consists of questions on the text of the translation test.

TABLE I

1. City.....School.....Class.....
2. Pupil's name.....Age, nearest birthday.....
3. This is my.....year of studying Latin.
4. Date.....
5. Time (in minutes) taken by test.....

LATIN VOCABULARY I

1. possum	14. audeo	27. arma	40. invitus
2. dico	15. capio	28. adolescens	41. liber, -ra, -erum
3. facio	16. homo, -inis	29. adventus	42. maximus
4. do, dare	17. res	30. aedes	43. in
5. habeo	18. iudicium	31. qui, quae, quod	44. non
6. puto	19. nihil	32. omnis	45. a, ab
7. arbitror	20. castra	33. hic, haec, hoc	46. etiam
8. gero	21. civis	34. nullus	47. ita
9. mitto	22. amicus	35. tantus	48. quidem
10. accipio	23. crimen, -inis	36. unus	49. ante
11. cognosco	24. deus	37. quidam	50. apud
12. constituo	25. acies	38. alter	
13. appello	26. annus	39. fortis	

LATIN VOCABULARY II

1. sum	14. animadverto	27. dolor	40. miser, -era,
2. video	15. censeo	28. aetas, -atis	-erum
3. videor	16. lex, legis	29. auctor	41. nefarius
4. volo, velle	17. populus	30. auxilium	42. ad
5. fero, ferre	18. vir	31. ille, -a, -ud	43. cum
6. venio, -ire	19. civitas	32. quis, quae, quid	44. et
7. credo, -ere	20. pecunia	33. suus	45. quod
8. intellego, -ere	21. jus, juris	34. aliquis	46. tamen
9. licet	22. genus, -eris	35. noster	47. tum
10. cogito	23. imperium	36. summus	48. at
11. concedo	24. salus, -utis	37. gravis	49. denique
12. conscribo	25. caput, -itis	38. inimicus	50. igitur
13. accido	26. cupiditas	39. reliquus	

LATIN VOCABULARY III

1. ago, -ere	7. scio, -ire	13. conjungo	19. scelus, -eris
2. debeo, -ere	8. decerno, -ere	14. conor	20. sententia
3. quaero, -ere	9. eripio, -ere	15. consequor	21. virtus, -utis
4. oportet	10. existimo	16. locus	22. equitatus
5. peto, -ere	11. coepei, -isse	17. modus	23. flumen
6. relinquo, -ere	12. confiteor, -eri	18. tempus, -oris	24. frater

TABLE I—*Continued*

25. frumentum	32. bonus	39. amplus	46. vero
26. classis	33. is, ea, id	40. optimus	47. ne
27. collis	34. vester	41. parvus	48. per
28. comitium	35. alius, -a, -ud	42. paucus	49. magis
29. condicio, -onis	36. totus	43. ut, uti	50. minime
30. consuetudo, -inis	37. ullus	44. atque	
31. tu	38. alienus	45. aut	

LATIN VOCABULARY IV

1. audio, -ire	14. dubito, -are	27. manus, -us	39. plurimus
2. judico, -are	15. duco, -ere	28. mens, -tis	40. posterus
3. soleo, -ere	16. animus	29. contio, -nis	41. praeclarus
4. teneo, -ere	17. bellum	30. corpus, -oris	42. cum
5. jubeo, -ere	18. consilium	31. idem, eadem,	43. de
6. nego, -are	19. vita	idem	44. e, ex
7. orno, -are	20. ager	32. ego	45. autem
8. consisto, -ere	21. copia	33. ipse, -a, -um	46. modo
9. contemno, -ere	22. exercitus	34. ceteri, -ae, -a	47. nam
10. corrumpto, -ere	23. fides	35. quantus	48. propter
11. cupio, -ire	24. gratia	36. clarus	49. sine
12. damno, -are	25. iter, itineris	37. communis	50. contra
13. doceo, -ere	26. laus, laudis	38. duo, -ae, -o	

TRANSLATION

Suggested Credit.

- | | |
|----|--|
| 5 | 1. Helvetii in Gallorum finibus bellum gerunt. |
| 5 | 2. Viri inimicos hastis fugabant. |
| 10 | 3. Legatos qui auxilium peterent misit. |
| 10 | 4. Hoc facere potuit. |
| 10 | 5. Laudari est gratum. |
| 10 | 6. Quaesivit ubi esset Caesar. |
| 10 | 7. Vereor ne absit |
| 10 | 8. Una pars quam Gallos obtinere dictum est, ad inferiorem partem fluminis Rheni pertinet. |
| 15 | 9. Gaius Julius Caesar, clarissimus imperator Romanus, librum de bello Gallico scripsit, quod ipse in Gallia gesserat. |
| 15 | 10. Hoc rumore audito, tantus terror omnium animos occupavit ut ne fortissimi quidem proelium committere vellent. |

100

GRAMMAR

10 for Each
Subquestion

1. State the case and the reason for using the case:

- | | | |
|---------------|-------------|-----|
| (a) Gallorum, | sentence 1. | |
| (b) finibus, | " | 1. |
| (c) hastis, | " | 2. |
| (d) partem, | " | 8. |
| (e) rumore, | " | 10. |

TABLE I—*Continued*

10 for Each Subquestion	2. State the form of the verb and the reason for using the form:	
	(a) peterent, sentence	3.
	(b) facere, “	4.
	(c) laudari, “	5.
	(d) esset, “	6.
	(e) obtinere, “	8.

Printed copies of the tests were given out on the same days to the four classes—Freshman, Sophomore, Junior, and Senior (785 pupils) in seven schools, in as many cities numbered consecutively from I to VII.¹ The time required by the pupils to complete each test was recorded. We found that ten minutes was ample time for each vocabulary; and that the translation and grammar test together required from thirty to forty minutes. Our experience suggests that in further studies the average time required for each test be the time allowed the pupils, and that the results be computed on this basis.

GRADING THE RESULTS

To obtain an objective standard for grading the results of the tests we proceeded as follows:

a) *Vocabulary*.—We assumed that all the words of the vocabulary chosen were of equal difficulty. Naturally this assumption should be tested by experiment, and some experiments were undertaken for this purpose, as follows: If the words are not of equal difficulty, and on the hypothesis that the difficulty of a word varies inversely with the frequency of its occurrence, the weight assigned to each word of the four vocabularies of fifty words each is shown in Table II. In this table the key letters *a, b, c, d, e, f, g, h*, represent the weight given to each word, that is to say, words used 1,000 times are assumed in the table to represent unit difficulty; hence, words used 500 times represent a difficulty of two units, etc. Further, particles used 100 to 200 times or more are called equal in difficulty to other words used 400 times.

On this basis the four vocabularies have the following weights: 141 units, 163.5 units, 165.82 units, 171 units, respectively. But

¹ Only the pupils in six schools (358 in number) are included in our results. The returns from one of the largest schools were received too late to be used in working out the correlations.

the work has not yet been carried far enough to test the validity of this weighting; and, in the results tabulated, we have assumed, as has been stated, that all the words in the four vocabularies are of equal difficulty.

TABLE II

<i>a</i> , words used	1000 times
<i>b</i> , " "	500 times
<i>c</i> , " "	400 times
<i>d</i> , " "	300 times
<i>e</i> , " "	200 times
<i>f</i> , " "	100 times
<i>g</i> , particles "	100-500 times (prepositions, conjunctions)
<i>h</i> , " "	100-200 times (adverbs, adjectives)

b) Translation.—So far as I know, no attempts have yet been made to secure approximately objective standards for grading Latin translations. After several provisional attempts to grade the various elements in a Latin sentence, we finally decided to

TABLE III

	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	<i>h</i>	Total
Vocab. I.	12	12	6	3	6	3	5	3	50
II.	12	12	3	3	6	6	6	2	50
III.	6	12	3	4	7	10	5	3	50
IV.	6	10	1	6	8	10	6	3	50

Words used 1000 times equal one unit

"	"	400	"	"	2.5 units
"	"	300	"	"	3.33 "
"	"	200	"	"	5.00 "
"	"	100	"	"	10.00 "

grade only accuracy in rendering into English the ideas contained in the Latin sentences; and, after some experiments to determine the difference between the grades attained by the pupils, when graded on the basis of all the elements of the sentence, and when graded by the simpler method which was finally adopted, we chose the simpler method because the grades arrived at by the two methods were nearly identical. This simpler method consists in

grading each idea in the sentence, as a whole, as of unit value. If the idea is correctly translated full credit is given; if it is not correctly translated no credit is given for that unit. The basis of each idea in a sentence is the verb. The sentences used in the test contain twenty verbs; hence each verbal clause if correctly translated is valued for convenience at five points ($20 \times 5 = 100$).

c) *Grammar*.—On the assumption that the grammar questions are equal in difficulty ten credits were assigned to each question.

The results of the tests, all reduced to a percentage basis, are given in Table IV (p. 348). The terms used in the table explain themselves, with the possible exception of “25q” and “75q.” Of these, 25q means the upper limit of the lowest quarter of the class, and 75q means the lower limit of the highest quarter. Hence it is evident that these measures indicate that one quarter of the class had a grade of 25q or below, one quarter 75q or above, and that half the class had grades between 25q and 75q.

It goes almost without saying that the percentages given in Table IV cannot be used in a comparison of the schools with each other, because of the different conditions in different schools. Table IV can be used, however, to compare the achievements of classes of the same grade in the same schools in successive years.

But the chief purpose of this study would not thereby be attained, namely, measuring the growth in power in the Latin language of individual pupils. For this purpose the individual records of the children obtained this year must be compared with their records at about the same time in successive years; and the way has been prepared for such comparisons.

CORRELATIONS

Correlation sheets showing the correlation of the grades in the three tests, vocabulary, translation, and grammar, were prepared (1) for each school separately; and (2) for the schools combined, so far as the returns were available at the time when the work was done. Since the returns from one of the largest schools were not

TABLE IV

SCHOOL	No. IN CLASS	VOCABULARY					TRANSLATION					GRAMMAR				
		Average	Median	Mode	25q	75q	Average	Median	Mode	25q	75q	Average	Median	Mode	25q	75q
Senior																
1.....	19	86.5	87.5	90	84	90	76.3	80	80	65	85	86.6	85	85	80	95
2.....	9	93	94.5	97	88.5	97	68.3	75	85	45	85	84	85	90	90	80
4.....	9	91.2	90.5	96	88	95	81.9	80	.....	75	90	82.2	80	.....	75	90
5.....	16	91.2	92	.....	88	94.5	86.8	90	95	75	95	87.8	90	85	85	95
6.....	18	95.6	96.5	96.5	95	98	94.7	95	95	95	100	95.9	99	100	90	100
7.....	56	88	90	91	86.5	92	84.2	85	85	75	90	82.4	85	90	75	95
Junior																
1.....	15	79.5	78	77.5	75	84	72.7	75	75-80	65	80	81.7	85	85	70	90
2.....	6	91	91	.....	88.5	94	72.5	70	.....	60	80	94	95	95-100	90	100
4.....	11	90.9	91.5	.....	84.5	96	90.8	95	95	90	95	94.5	100	100	95	100
5.....	24	87.2	88	89	82.5	91.5	83.1	90	90	75	90	84.8	90	70-95	75	95
6.....	28	93.2	95	96	90	97.5	94.1	95	95	90	100	91.9	95	90	90	95
7.....	73	84.3	86.5	.....	79.5	91.5	79.3	80	80	65	85	73.7	85	90	70	90
Sophomore																
1.....	27	74.7	74+	.....	70	81	59.2	60	50-60	50	70	80	80	80-85	75	85
2.....	16	60	59.5	60	51	69.5	37.2	30	30	15	60	58	60	90	25	90
4.....	23	87.7	87	.....	84	93	80.4	75	75	70	90	87.4	90	100	80	100
5.....	35	76.5	78	74	72.5	84.5	77.1	80	80	70	90	75.9	75	75	65	90
6.....	34	88.4	88	87.5	85.5	92	84.7	90	90	80	95	86.6	90	90	80	95
7.....	105	60.9	62.5	.....	51	71.5	62.8	55	55	40	70	54.5	65	70	50	75
Freshman																
5.....	52	61.7	61	59	55.5	66.5	45.7	45	45-60	35	60	59.2	60	55-85	45	75
6.....	28	80.3	81	84	76	84.5	77.7	80	90	65	90	87.1	90	90	80	90
7.....	117	38.9	40	.....	33.5	47.5	34.8	25	20	15	40	28	35	35	20	45

ready at that time, this summary pertains to only 358 pupils. The correlation sheets show that 52 per cent of the pupils fall in the same third of their respective classes, in both grammar and translation, and also in both vocabulary and translation. We find also that one-third of the entire number fall in the same third of the class (the same tertile) in all three subjects.

Perfect correlation, as the expression is used in this paper, would require that the same individuals who were in the first tertile in grammar should also be in the first tertile of the class in both translation and vocabulary; in the same way, the individuals who make up the second and third tertiles in any one subject must be the same who are included in the corresponding tertiles in the other two subjects. Also perfect correlation in any two of these subjects of course means for any pupil that he is in the same tertile in both of them.

Arranging the correlations found in tabular form we have:

TABLE V

I. PERFECT CORRELATION IN ALL THREE SUBJECTS

Out of 358 pupils	{	52 were in the first third of the class in all three subjects.
		20 were in the second third in all three subjects.
		41 were in the third third in all three subjects.
		113 or <i>almost one-third</i> of the class show perfect correlation.

II. PERFECT CORRELATION IN GRAMMAR AND TRANSLATION

Out of 358 pupils	{	78 were in the first third of the class in grammar and translation.
		45 were in the second third.
		65 were in the third third.
		188, or 52.5 per cent, show perfect correlation in these two subjects.

TABLE V—*Continued*III. PERFECT CORRELATION IN VOCABULARY
AND TRANSLATION

Out of 358 pupils	{	77 were in the first third of the class in vocabulary and translation.
		46 were in the second third.
		66 were in the third third.
		—
		189, or 52.8 per cent, show perfect correlation in these two subjects.

IV. PERFECT CORRELATION IN VOCABULARY
AND GRAMMAR

Out of 358 pupils	{	64 were in the first third of the class in vocabulary and grammar.
		44 were in the second third.
		63 were in the third third.
		—
		171, or 47 per cent, show perfect correlation in these two subjects.

GENERAL SUMMARY

1. The purpose of the foregoing study is to measure the growth of power in Latin, and to discover the correlations of this power in three phases of language-study—vocabulary, translation, and grammar.

2. For this purpose a test in vocabulary, translation, and grammar has been devised, to be applied to the same pupils at about the same time in successive years. Further experiments with the vocabulary test are needed to determine whether a single list of fifty words is sufficient; and whether the words chosen are of approximately equal value.

3. The grading of the translation and grammar results has been tested and has thus far justified itself; but further experiments with these tests are needed to reach a definite conclusion on this point.

4. Table IV may be used to determine the relative achievements of classes of the same grade in the same schools in successive years.

5. But the chief purpose of the tests will be achieved only by comparing the records made by individual pupils in successive years.

6. The correlations of the grades of individual pupils must be studied to diagnose individual aptitudes and deficiencies. The bearing of such diagnoses on teaching is obvious.

7. The correlation study covers, as yet, so small a number of cases that generalizations as to the relative emphasis the three fundamentals of language acquisition demand for satisfactory growth would be premature; but further study should throw light on this question.

8. The whole study is a first attempt in a new field; is confessedly tentative; and the conclusions arrived at are wholly provisional.